a laugh or of flattering the modern sense of superiority. The only way to understand these old writers is to try to put ourselves as far as possible in their place, and conceive how nature and science presented themselves to the eyes of the early teachers and learners in the tenth and eleventh centuries."

A full account is given of the mythical "mandrake," with several instructive drawings from Anglo-Saxon manuscripts (see Fig. 1), and others of plants which can be recognised as characteristic, while some are gracefully conventional. Many drawings of foreign plants are copied from more original sketches, until they have become mere ornamental designs. These figures may be compared with the beautiful drawings published by Prof. Haeckel of animal structures adapted to suggest the decorative use of countless organic forms to carry on the conventional lines of Greek architects and Italian decorators.

An interesting section of Dr. Payne's volume is devoted to the old English names of plants. "Waybroad" has been ill exchanged for the so-called plantain, and "maythe" for camomile. On the whole, he agrees with Prof. Earle that there was a great decadence in botanical knowledge in England between the eleventh and sixteenth centuries.

The practice of surgery by the Anglo-Saxon leeches was for the most part confined to the external application of divers vegetable or animal concoctions which can have been only negatively useful. Some of them remind us of Alexis of Piedmont, who, after describing an unfailing remedy, adds, "If this will not do it, take this other." Here and there we come across curious anticipations of modern pathology and surgery, *e.g.* when we are told that if the insensible hardening of the liver is of too long duration, then it forms a dropsy which cannot be cured; or when the plastic operation for hare-lip is described. Amputation for gangrene of a limb is also recommended.

The last sixty pages are devoted to superstitious treatment by amulets and charms, some derived from Greek treatises, as they in their turn reproduced the magical lore of Egypt and of Babylon. One extract, however, from a sermon of St. Eligius, who furnished the gentle abbess of the "Canterbury Tales" with her only oath, might still be preached from English pulpits against the quackery and miscalled Christian science of the present day. If space permitted, it would be interesting to refer to Dr. Payne's comparison between the "Practica" of the famous school of Salernum and the old English "Leech-book," and to his account of the final decay of the native art of medicine and its replacement by the less vigorous and less original doctrines of Continental Europe in the later Middle Ages.

The work is of great value and interest not only to physicians, but to scholars, antiquarians, and philologists. It is admirably printed and illustrated, and will, we hope, be succeeded by the publication of future lectures by the same accomplished physician.

NOTES.

THE *Atti dei Lincei* announces the death on August 19 of Prof. Emilio Villari, recently president of the Reale Accademia dei Lincei.

MR. C. FOX-STRANGWAYS, who joined the staff of the Geological Survey in 1867, has retired from the public service.

AN earthquake shock was felt in the Cowall district of Argyllshire shortly after 4 a.m. on September 18. In Dunoon the shock was most distinctly felt. Dishes rattled, doors were opened, bells were set ringing, and ornaments were broken.

REUTER reports that two distinct shocks of earthquake were felt at Ottawa at 7.53 p.m. on September 14. The first lasted five seconds, and after an intermission of three seconds came the second shock, which was of six seconds' duration. The direction was from south-west to north-east.

A CONGRESS of free thought was opened at Rome on Tuesday in the Grand Court of the Roman College. Prof. Sergi, president of the committee, welcomed the members of the congress, and the following were elected honorary presidents:—Prof. Haeckel (Germany), M. Berthelot (France), Dr. Maudsley (Great Britain), Señor Salmeron (Spain), M. Novimoff (Russia), Herr Bjoersen (Norway), and Prof. Lombroso (Italy).

AT the St. Louis Exhibition a steel tower 300 feet high has been erected for wireless telegraphy by Dr. De Forest and his coadjutors, and communication has been established between St. Louis and Chicago. We learn from the *Times* that the United States Government is also exhibiting a working De Forest station, and there are seven working exhibits in the exhibition. The United States Government has contracted with the De Forest Company for five long-distance stations at Key West, Pensacola, Puertorico, South Cuba, and Panama. The longest distance between these stations will be 1000 miles, which will far exceed the distance attempted for wireless telegraphy by any Government before.

IT is announced that the high-level observatory on Ben Nevis will be closed next month. The annual cost of the double observatory, high- and low-level, is close on 1000*l.*; of this sum about three-fourths is spent on the high-level and about one-fourth on the low-level station. The Treasury has offered to pay direct to the Scottish Meteorological Society on behalf of the Ben Nevis Observatory the 350*l.* recommended by the committee of inquiry into the administration of the Parliamentary grant for meteorology, instead of making this sum a charge on the meteorological grant. The continuance of the observatories could, however, only be undertaken on a guaranteed income of 1000*l.* a year. The directors have therefore decided to close the observatories.

THE New York correspondent of the *Daily Chronicle* announces that Commander Peary will lead another expedition to the North Pole next year. The expedition will start in the summer, and will be gone probably not longer than two years. Its expenses are estimated at 30,000*l.*, which is 10,000*l.* more than the last Peary Expedition cost. American capitalists are supplying the funds. A vessel is now being built which, it is said, will be stronger and more suitable to the conditions prevailing in the Polar regons than any previous ship. One part of her equipment will be an ice-breaker bow, which is expected to enable the ship to break through to a point farther north than has hitherto been reached. The features of the expedition will be the fixing of a base within 500 miles of the Pole, the use of very light sledges and fast Esquimaux dogs to make a final dash for the Pole, and the adoption of conditions of living corresponding as nearly as possible to those of the Esquimaux themselves.

THE expedition, on board the steamer *Frithjof*, which took out a supply of coal for the Ziegler North Polar Expedition, whose ship, the *America*, left for the Arctic regions nearly fifteen months ago, has returned to Norway without having communicated with the *America*. This is the second attempt which has been made this year by the relief expedition to reach Franz Josef Land, but on each occasion the severity of the weather, together with fog and ice, has

compelled the *Frithjof* to return; and now it is impossible that another attempt can be made until next year. There has been no news of the *America* since she left Norway in July, 1903, but, so far as can be ascertained, it was intended that on reaching Franz Josef Land the explorers should establish a supply base, from which forced marches would be made in the direction of the Pole. No apprehension is felt concerning the *America*, for the ship carried provisions for five years, and there are also stores of pemmican and clothes available.

SCIENTIFIC critics in Berlin are now much exercised with regard to the remarkable performances of "Clever Hans," the thinking horse. According to the daily Press, a representative committee, which included the director of the Berlin Zoological Gardens, a veterinary surgeon, and a professor of the Physiological Institute of the Berlin University, witnessed these performances with the view of ascertaining whether they were the result of a trick, or whether they were due to the mental powers of the animal. Their verdict, it is reported, was unanimous in favour of the latter view. It is stated that when told that the day was Tuesday, and asked which day of the week this represented, the horse would give the correct answer by taps. Similarly he will tell not only the hour, but the minutes indicated by a watch; while he is also reported to be able to record the number of men and of women among a row of visitors, and to indicate the tallest and the shortest members of the party.

IT is stated in the *Times* that Messrs. C. G. Spencer and Sons, of Highbury, have lately constructed, from the designs of Señor Alvares, a new aëroplane flying machine which does away with the gas vessel and its many risks. The structure consists of two swing-like aëroplanes having a superficial area of 400 square feet; these are attached to two outstretching and slightly curved arms and fixed to a bamboo framework, in shape like a cigar. In the front of this framework is fitted a 2 horse-power motor, which drives two two-bladed tractors—each of them 5 feet in diameter—which are placed one on each side of the frame, and level with the motor. At the back of the machine are three rudders, which are worked from the front by means of ropes. Two of the rudders are triangular, and are constructed to move horizontally, for the purpose of controlling the upward and downward motion of the machine, while the other, the largest of the three, which is rectangular, is fitted perpendicularly, and is intended to guide the machine to the left or right. The weight of the machine is 150 lb. without the aëronaut. It does not appear that the invention has any power of raising itself from the ground, as it is stated that during the next few days it is to be taken up by a balloon, at the Crystal Palace, to an altitude of 5000 feet, when it will be released for the purpose of testing its actual power of flight.

SIR LOWTHIAN BELL was elected president of the Institution of Mining Engineers for the ensuing year at the meeting held at Birmingham last week. A paper by Prof. Redmayne read before the meeting is summarised on p. 524. Among other papers read was one by Mr. George Farmer, on the problem of gob-fires, in the course of which he pointed out that coal absorbs oxygen quickly, and more quickly as the surface open to oxidation increases and as the heat increases, so that any cause which will split up the gob-material will aid in initiating a fire. Moisture assists the oxidation and heating by splitting up the gob-material, so that this may be considered an important factor. In every case in which a fire has been properly located props left in the goaf, or ribs of coal left against faults, or falls in working stalls burying a rib of coal, have been found to be the origin. In any method of extinction means must be taken for cooling the hot material by the application of substances which will absorb the heat and reduce the temperature to such a degree that combustion entirely ceases in a natural atmosphere, or by the removal of the combustible material from the influence of the heat. Mr. J. Cresswell-Roscamp described an improved apparatus for laying dust in coal mines. Water (or other liquid) is forced by pumps into an air-cylinder, which causes a regular and unpulsating column to flow along the pipes and out of sprayers or nozzles fitted with a specially constructed screw apparatus round which the liquid is forced, so as to cause the spray to spread over a circular breadth up to 30 feet. The sprays are in the shape of inverted cones impinging on each other, and become broken up into extremely fine particles, which are carried along by the air current and can clearly be felt from 100 feet to 150 feet behind the apparatus when in motion.

IN the year 1883 the late Sir Cuthbert Peek established an important meteorological station at Rousdon, Devon, midway between Lyme Regis and Seaton, and from time to time various self-recording instruments, including a Dines's pressure tube anemometer, have been added. The observations have been regularly continued under the superintendence of the Hon. Lady Peek, and we have received a copy of the results for the year 1903. As this volume completes a period of twenty years, tables are appended giving the average monthly and annual results for the years 1884–93. The observatory is a second order station of the Royal Meteorological Society, and the work is a valuable contribution to the climatology of the south of England.

WE have received the report of the U.S. Weather Bureau for 1902–3. The first part of this elaborate compilation, containing a very interesting account of the administrative work of the year, was referred to in our issue of February 4 (vol. lxix. p. 328). The remaining portions consist of meteorological summaries, including hourly averages from the records of automatic instruments at twenty-eight stations, and monthly and annual means at stations in the United States and West Indies. Among the many valuable miscellaneous tables and reports we may mention especially those showing the accumulated amounts of precipitation for each five minutes at stations in the United States and West Indies supplied with automatic gauges, during all storms in which the rate of fall equalled 0·25 inch in five minutes or 0·75 inch in one hour. The volume also contains hourly observations at several localities in the West Indies; these are of importance in connection with the study of the destructive hurricanes which frequently occur in those regions.

IT may be of interest to some of our readers to know that very complete meteorological observations, taken three times a day at the Central Meteorological Office at Vienna, together with daily and monthly means, are regularly published in the *Anzeiger* of the Vienna Academy of Sciences. Further, that the observations for each month are followed by the observations made in connection with the international scientific balloon ascents. We have before us the results of two ascents of manned and one of unmanned balloons in the month of June last. In addition to the summary of the principal facts obtained during the ascents, the actual observations taken every few minutes and explanatory remarks are given. The publication of these valuable data so soon after their occurrence is of considerable importance for the study of the processes at work in the upper strata

of the atmosphere, in connection with weather recently experienced.

THE Biological Survey of the U.S. Department of Agriculture has issued a *Circular* (No. 44) giving the names and addresses of officials connected with the preservation of birds and game in the United States and Canada.

WE have received Nos. 17 and 18 of vol. xlviii. of the *Memoirs* of the Manchester Literary and Philosophical Society. In the latter Dr. Hoyle gives a diagnostic key to the recent genera of dibranchiate cephalopods. In the former Prof. Dawkins describes a molar of the straight-tusked elephant (*Elephas antiquus*) from glacial strata at Blackpool. Apropos of fossil elephants, it may be mentioned that a few days ago workmen disentombed in a sand-pit at Erith an entire skull of a mammoth, which fell to pieces when brought to the surface. This is much to be regretted, as the specimen might doubtless have been saved had palæontologists been informed of the discovery before attempts were made to remove it from the bed.

THE August number of the *Brooklyn Edison*, published by the Edison Electric Illuminating Co., of Brooklyn, New York, contains several striking pictures of decorative and spectacular electric lighting at Coney Island, one of which, from a photograph taken at night, is here reproduced. Within a year the amount of electric illumination at this famous pleasure resort has more than trebled; and probably

FIG. 1.—Luna Park, Coney Island, showing the magnitude and extent of the electric illumination. From a photograph taken at night.

there is not now to be found anywhere in the world a place where the decorative possibilities of the electric incandescent lamp are so strikingly demonstrated. The Brooklyn Edison Co., which has successfully carried out the scheme of lighting at Coney Island, supplies light and power to an area of seventy-seven square miles and a population of nearly one and a half millions.

AN important discovery in connection with cotton-growing in the southern United States is recorded in *Bulletin* No. 49 of the Entomological Division of the U.S. Department of Agriculture. It appears that an ant has been discovered in Guatemala which preys on the adult cotton boll-weevil (*Anthonomus grandis*) and thus checks the ravages of this insect, and so permits the growing of cotton in districts where it would otherwise be impossible. It has been found that the kelep, as the ant is called in Guatemala, can be easily removed, and colonies have accordingly been introduced into the cotton plantations of Texas in the hope of checking the devastation caused by the weevil. It only remains to ascertain whether the kelep will be able to withstand the winter climate of Texas.

THE last published part of *Biometrika* contains a valuable paper by Dr. H. E. Crampton demonstrating the existence of natural selection during the pupal stage of *Philosamia cynthia*, a silk-producing moth. Dr. Crampton's observations differ from the experiments conducted by Prof. E. B. Poulton, Mr. F. Merrifield, and Miss C. Sanders in the fact that his pupæ were not exposed to the attacks of enemies; so that the elimination, which took place on a large scale, must presumably have been due to internal rather than external causes. In the author's opinion, the actual basis for selection in this particular instance is not use-advantage, but correlation. Prof. Pearson's important Huxley lecture on the inheritance of the mental and moral characters in man has been already noticed in the pages of NATURE. An elaborate memoir, illustrated by a very fine series of photographs, on the variation and correlation of the human skull, is contributed by Dr. W. R. Macdonell. The material discussed is the splendid series of skulls discovered some eleven years ago in Whitechapel, and now in the possession of Prof. Thane. Dr. Macdonell concludes that these crania, which date most probably from the time of the Great Plague, are in general appearance and biometric constants remarkably close to the Long Barrow British. As the result of an investigation on inheritance of coat-colour in the greyhound, A. Barrington, A. Lee, and K. Pearson conclude that the ancestral law of decreasing correlation holds no less for their present material than for man and horse. Prof. Weldon's research on the form of the shell spiral in a race of *Clausilia itala* failed to disclose the existence of any selective elimination between the young and the adult stage; reasons for this result are suggested. The number ends with an elementary proof of Sheppard's formulæ, with which are associated certain other formulæ for dealing with the ordinates and adjacent areas of frequency curves.

THOUGH graphical work is now rightly regarded as an essential part of an elementary course of mathematics, many teachers are still unfamiliar with the new methods, and do not comprehend clearly all that is implied in graphs. The "Solutions of the Examples in Hall's 'Graphical Algebra,'" by Mr. H. S. Hall, assisted by Mr. H. C. Beaven, just published by Messrs. Macmillan and Co., Ltd., will be of great service to those teachers and students to whom graphical methods are novel, in showing how problems may be easily and accurately solved by plotting graphs. The book will assist the introduction and extension of graphical methods in mathematical classes.

A CATALOGUE of apparatus for electric heating and cooking just issued by Messrs. Isenthal and Co., 85 Mortimer Street, London, W., contains particulars of many attractive ways in which electricity is used for heating purposes. The advantages of electric heating from a hygienic point of view are obvious; and, economically, the consumption of electric energy is not so excessive as is usually assumed. Messrs. Isenthal's list includes radiators of various types, ornamental stoves, cooking ranges and ovens, appliances for heating and boiling liquids, hot water geysers and cisterns, sterilisers, soldering bits, hot plates for chemical laboratories or photographic purposes, evaporators, and numerous other devices which would add to the comfort and cleanliness of many operations in laboratories as well as in houses. The adaptability of the electric current, and the efficiency of the various forms of apparatus described in Messrs. Isenthal's catalogue, should encourage the use of electric energy as a source of heat.

IN the August number of the *Gazzetta* E. Paternò and E. Pannain have established that, under certain conditions, electrolysis converts potassium cyanide in aqueous solution containing potash completely into cyanate. The latter separates during the electrolysis in a pure state in the form of white crystals.

ACCORDING to a brief report by J. Stěp, director of the Joachimsthal Mine, published in the *Proceedings* of the Vienna Academy of Sciences (No. 14), freshly excavated uranium ore, which has never been exposed to the light, is strongly radio-active. A comparative study of the activity of illuminated and unilluminated specimens of the ore has yet to be made.

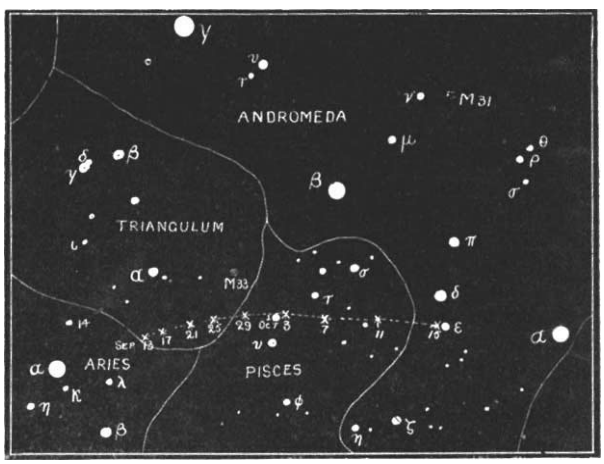
IN vol. vii. of the *Fortschritte auf dem Gebiete der Röntgenstrahlen* Dr. Josef Rosenthal discusses the relative advantages of large and small induction coils for producing X-rays. When the tube used is not too highly exhausted, and consequently has not too great a resistance, a small coil giving a comparatively short spark may be used with good results. Small coils have, moreover, the advantage of being more portable and less costly than large coils. But when a tube with a high vacuum is used a higher tension coil has to be employed, and in such cases, in order to prevent the tube from changing during a long exposure, the number of interruptions per second must be reduced as much as possible.

OUR ASTRONOMICAL COLUMN.

THE RETURN OF ENCKE'S COMET (1904 *b*).—As announced in these columns last week, Encke's comet was re-discovered at Koenigstuhl-Heidelberg on September 11.

It was found by Herr Kopff, who describes it as being, at present, a faint object. According to a note by Mr. Denning, however, mentioned in NATURE for July 21, the favourable conditions of 1805, 1838, and 1871 should be repeated during the present apparition, and it is possible that the comet may become visible to the naked eye when near to Altair, early in December.

The accompanying chart given below shows, approximately, the apparent path of the comet among the stars from now until October 15, according to the daily ephemeris published by MM. Kaminsky and Ocoulitsch in No. 3962 of the *Astronomische Nachrichten*:—



VARIATIONS IN THE LUNAR LANDSCAPE.—A communication from Harvard reports that Prof. W. H. Pickering, at present located at the Lowe Observatory, California, observed a bright hazy object 2″ in diameter upon the floor of the lunar crater Plato on July 31. Six previous observations made between July 21–28 inclusive gave no indication of this novel feature.

On August 2 a black elliptical shadow two miles in diameter was seen in the place of the previously observed bright spot, whilst to the north-east and north there extended a large white area, the existence of which was confirmed by an observation made on August 3.

A telegram dated August 22 states that real conspicuous changes have taken place in this region during the past month, and confirms the existence of the new crater, which has a diameter of about three miles. The bright area has shifted considerably since August 3.

Several other objects which have not been mapped before were observed whilst examining Plato, and it was seen that the previously conspicuous white area surrounding craterlet No. 54 (Harvard College Observatory *Annals*, vol. xxxii., plate x.) has now disappeared.

SUN-SPOT PERIODICITY AND TERRESTRIAL PHENOMENA.—In a brochure published at Rochechouart (1904), Prof. O'Reilly, of Dublin, emphasises the important part which a knowledge of the periodicity of solar activity plays in the prediction of terrestrial meteorological events, and also demonstrates that the origins of several important historical events may possibly be attributed to the meteorological effects of solar changes.

After discussing the more recent droughts, such as have caused distress in Australia and India, and showing that these occurred at definite epochs of solar cycles, he shows that the successive floods which caused the formation of the Zuyder Zee probably occurred at epochs of sun-spot maxima. Similarly he points out that each of the ten centuries in Etruscan chronology were approximately 122·2 (*i.e.* $11 \cdot 11 \times 11$, or nearly 11^2) years in length, that is to say, they contained about eleven sun-spot periods, and he supposes that the Etruscan era probably commenced from a period of great cold, or maybe some memorable flood, which could be attributed to excessive solar activity.

From a study of Brückner's sun-spot cycles, Prof. O'Reilly believes that the year 1895 was the culminating year of a period of heat and drought, and that 1915 will be the corresponding centre-year of a period of cold and rain.

OBSERVATIONS OF THE RECENT PERSEID SHOWER.—M. Henri Perrotin, observing at Nice, saw 1184 meteors, of which 1041 were Perseids, during the nights of August 9–14 inclusive. The observations were made between the hours of 8 p.m. and 3 a.m. each night at the meteorological station of the Nice Observatory, situated at an altitude of 2740 metres on Mount Mounier.

The Perseids, as shown in his tabulated results, were very numerous, the maximum display of the shower occurring on the night of August 11–12, especially between 1 a.m. and 3 a.m. The maximum for each night occurred between midnight and 3 a.m.

A notable feature of the display was that the meteors appeared in groups of two or more, each group being followed by a break five to fifteen minutes in length.

The radiant of the shower was seen to be a fairly extensive area, not a point, having its centre near to γ Persei.

The Perseids were white and very swift, whilst the paths were comparatively short. On the other hand, the sporadic meteors observed were of a reddish-yellow colour, their paths were long, and they travelled slowly, leaving trails which lasted for some seconds.

These observations again emphasised the importance of selecting a station situated at a high altitude where the atmosphere is generally exceptionally clear (*Comptes rendus*, No. 9, 1904).

RADIATION IN THE SOLAR SYSTEM.[1]

I PROPOSE to discuss this afternoon certain effects of the energy which is continuously pouring out from the sun on all sides with the speed of light, the energy which we call sunlight when we enjoy the brilliance of a cloudless sky, which we call heat when we bask in its warmth, the stream of radiation which supports all life on our globe and is the source of all our energy.

As we all know, this ceaseless stream of energy is a form of wave motion. If we pass a beam of sunlight, or its equivalent, the beam from an electric arc, through a prism, the disturbance is analysed into a spectrum of colours, each colour of a different wave-length, the length of wave changing as we go down the spectrum from, say, 1/30,000 inch in the red to 1/80,000 of an inch in the blue or violet.

But this visible spectrum is merely the part of the stream of radiation which affects the eye. Beyond the violet are

[1] Afternoon address delivered at the Cambridge meeting of the British Association, August 23, by Prof. J. H. Poynting, F.R.S.